

CLAIMS

1. A layered product as a molded object comprising a
5 thermosetting resin layer, a thermoplastic resin layer and groups
of reinforcing fibers consisting of numerous continuous filaments,
wherein said thermosetting resin layer and said thermoplastic
resin layer are integrated at the interface between these layers
in such a manner that the resin of said thermosetting resin layer
10 and the resin of said thermoplastic resin layer are formed to be
rugged at the interface; a set of filaments among said groups of
reinforcing fibers is kept in contact with at least the resin of
said thermosetting resin layer while the other set of filaments
among said groups of reinforcing fibers is kept in contact with
15 at least the resin of said thermoplastic resin layer; and the face
of said thermoplastic resin layer opposite to said interface is
positioned on the surface of said molded object.
2. A layered product, according to claim 1, wherein said
numerous continuous filaments are arranged in one direction, and
20 the interface between said thermosetting resin layer and said
thermoplastic resin layer exists among said groups of reinforcing
fibers.
3. A layered product, according to claim 1, wherein the glass
transition temperature of the resin forming said thermosetting
25 resin layer is 60°C or higher.
4. A layered product, according to claim 1, wherein in said

thermoplastic resin layer, the maximum thickness of the area where said continuous filaments exist is 10 μm or more.

5. A layered product, according to claim 4, wherein said maximum thickness is 1,000 μm or less.

5 6. A layered product, according to claim 1, wherein the surface area of said thermoplastic resin layer accounts for 0.1 to 50% of the surface area of the layered product.

7. A layered product, according to claim 1, wherein a layer having the same structure as that formed of said thermosetting resin, said thermoplastic resin and groups of reinforcing fibers consisting of numerous continuous filaments is formed on the face of the layered product on the side opposite to the side where said thermoplastic resin layer is positioned.

10 8. A layered product, according to claim 1, wherein the bonding strength of the test piece of the layered product defined in the specification based on ISO4587 is 6 MPa or higher at room temperature.

9. A layered product, comprising a thermosetting resin composition having groups of reinforcing fibers consisting of numerous continuous filaments arranged in a thermosetting matrix resin and a film composed of a thermoplastic resin composition formed at least on a portion of the surface of said thermosetting resin composition, wherein the normal bonding strength defined in the specification between the layered product and another molded object bonded through said film is 10 MPa or higher at a temperature of 40°C and lower than 10 MPa at a temperature of 140°C.

10. A layered product, according to claim 9, wherein the average thickness of said film composed of a thermoplastic resin composition is from 0.1 to 1,000 μm .

11. A layered product, according to claim 1 or 9, wherein the numerous continuous filaments constituting said groups of reinforcing fibers are carbon fibers.

12. A layered product, according to claim 1 or 9, wherein said thermosetting resin is a resin mainly composed of an epoxy resin.

13. A layered product, according to claim 1 or 9, wherein said thermoplastic resin is at least one resin selected from a group consisting of polyamide-based resins, polyester-based resins, polycarbonate-based resins, styrene-based resins, EVA resin, urethane-based resins, acrylic resins, polyolefin-based resins and PPS-based resins.

14. A process for producing a layered product as set forth in claim 1 or 9, comprising the steps of disposing a base material for thermal bonding composed of a thermoplastic resin, on a surface of a prepreg obtained by impregnating groups of reinforcing fibers consisting of numerous continuous filaments with a thermosetting resin not yet set, and impregnating said groups of reinforcing fibers with the thermoplastic resin of said base material for thermal bonding, during the setting reaction of said thermosetting resin or during preheating before the setting reaction.

15. A process for producing a layered product, according to claim 14, wherein a pressing pressure of 0.1 MPa or higher is caused

to act when said groups of reinforcing fibers are impregnated with the thermoplastic resin.

16. An integrated molded object which comprises a first member composed of a layered product as set forth in claim 1 or 9 and
5 a second member composed of another structural member, wherein the first member and the second member are bonded to each other through said thermoplastic resin in said first member.

17. An integrated molded object, according to claim 16, wherein said second member is at least one member selected from the group
10 consisting of a member composed of a layered product as set forth in claim 1 or 9, a member composed of a thermoplastic resin composition and a member composed of a metallic material.

18. A process for producing an integrated molded object as set forth in claim 16, comprising the step of integrating a first
15 member composed of a layered product as set forth in claim 1 or 9 and a second member composed of another structural member with each other, by at least one integration method selected from the group consisting of thermal welding, vibration welding, ultrasonic welding, laser welding, insert injection molding and
20 outsert injection molding.

19. An integrated molded object, according to claim 16, which is a part member or a housing of an electric or electronic apparatus, an office automation apparatus, a household electric appliance or a medical apparatus.

25 20. An integrated molded object, according to claim 16, which is a part member or a panel of a motor vehicle, a two-wheeler,

a bicycle, an aircraft or an architecture.

21. A base material for thermal bonding of adhering members of identical and/or different kinds, wherein the bonding strength (S) of the test piece of the layered product defined in the specification based on ISO4587 is 5.0 MPa or higher at a temperature of 100°C and 1.0 MPa or lower at a temperature of 200°C.

22. A base material for thermal bonding, according to claim 21, wherein where the bonding strength at a temperature t (°C) is S_t (MPa) and the bonding strength at a temperature $(t + 30)$ (°C) is $S_{(t+30)}$ (MPa), the temperature t satisfying the relation of $S_t \geq 3 \times S_{(t+30)}$ is from 100°C to 200°C.

23. A base material for thermal bonding, according to claim 21, wherein said base material is composed of a copolyamide-based resin composition.

24. A base material for thermal bonding, according to claim 23, wherein said copolyamide contains ternary copolyamide 6/66/610 as a component.

25. A base material for thermal bonding, according to claim 21, wherein said base material is in a form of a nonwoven fabric or film having a unit weight of 1 to 100 g/m².

26. A process for producing a layered product, according to claim 14, wherein said base material for thermal bonding is a base material for thermal bonding as set forth in claim 21.

27. An electromagnetic-shielding molded object, obtained by integrating a first structural member composed of a resin composition having groups of conductive fibers consisting of

numerous continuous filaments arranged therein and a second structural member composed of a thermoplastic resin composition, wherein the electromagnetic shielding property of said first structural member at a frequency of 1 GHz measured according to the KEC method is 40 dB or more.

28. An electromagnetic-shielding molded object, according to claim 27, wherein said first structural member is a layered product as set forth in claim 11.

29. An electromagnetic-shielding molded object, according to claim 27, wherein the flexural modulus of said first structural member based on ASTM D790 is 8 GPa or more as the test piece defined in the specification.

30. An electromagnetic-shielding molded object, according to claim 27, wherein the average thickness of said first structural member is 1.6 mm or less.

31. An electromagnetic-shielding molded object, according to claim 27, wherein when the molded object is observed from outside, a pattern based on an arranged state of said numerous continuous filaments can be observed.

32. An electromagnetic-shielding molded object, according to claim 27, wherein the resin composition in said first structural member is a thermosetting resin.

33. An electromagnetic-shielding molded object, according to claim 27, wherein the resin composition in said first structural member is a thermoplastic resin.

34. An electromagnetic-shielding molded object, according to

claim 27, wherein the thermoplastic resin composition of said second structural member contains discontinuous carbon fibers; the weight average fiber length L_w of said carbon fibers is 0.4 mm or more; and the ratio L_w/L_n of the weight average fiber length L_w to the number average fiber length L_n is from 1.3 to 2.0.

35. An electromagnetic-shielding molded object, which is a part member or a housing of an electric or electronic apparatus, an office automation apparatus, a household electric appliance or a medical apparatus.

36. An electromagnetic-shielding molded object, according to claim 35, wherein said first structural member is positioned at least at a portion of a top face portion of said housing, and said second structural member is positioned at a member including any one or more of a frame, boss, rib, hinge and runner of said housing.

37. A process for producing an electromagnetic-shielding molded object as set forth in claim 27, comprising a first step of inserting a first structural member produced by molding beforehand, into a mold and a second step of injecting a thermoplastic resin composition to form a second structural member, to the first structural member inserted in said mold, for integrating said second structural member with said first structural member.

38. A process for producing an electromagnetic-shielding molded object as set forth in claim 27, comprising the step of integrating a first structural member produced by molding beforehand and a second structural member produced by injection

molding beforehand, by means of ultrasonic welding.